PANEL CLIP ASSEMBLY FOR USE WITH ROOF OR WALL PANELS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is related to co-pending U.S. Provisional Application Serial No. 60/414,706 filed November 8, 2002.

DESCRIPTION

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention generally relates to a panel clip assembly and more particularly, to a panel clip assembly for use with skylight, roof or wall panels having improved strength, improved noise reduction and improved allowance for longitudinal and transverse panel movement in response to thermal expansion and contraction of the panels.

DESCRIPTION OF THE PRIOR ART

[0002] It is well known to secure standing seam roof and wall panels, including translucent panels, to purlin or girt substrates using hidden clips and related clip assemblies. Examples of various of these clip assemblies are shown in U.S. Patent Nos. 4,184,299, 4.193,247, 4261,998, 4,495,743, 4,543,760, 4,575,983, 5,001,882, 5,181,360, 5,222,341, 5,363,624, 5,606,838 and 6,164,024. As noted in this prior art, a continuing problem has existed concerning the impact of thermal forces (expansion and contraction) on panels supported and joined together by clip assemblies. By way of example, if clip assemblies are too rigid, damage may occur to the panels or clip assemblies during thermal expansion or contraction. In addition, undesirable noises and wear are caused by frictional panel movement resulting from thermal and other

forces, i.e. panels rubbing against the clip assembly, against the fasteners that hold the clip assembly, and against the substrates. Our design addresses these problems.

[0003] Also, in response to these concerns, some prior clip assemblies have been designed with two interlocking but moveable pieces. More specifically, clip assemblies have been designed with a lower base member that is fixed to a substrate and an upper clip member which is attached to the base member in such a manner that the upper clip member can slide parallel to the seam created by adjoining panel members. See, e.g., U.S. Patent No. 4,575,983. This sliding movement helps relieve expansion and contraction forces that run parallel to the panel seam.

[0004] Existing clip assemblies continue to experience problems from thermal forces, however. In particular, existing clip assemblies are too rigid in respect to, and do not adequately address, thermal forces that are applied perpendicular to panel seams (and perpendicular to the sliding movement allowed for in the clip assemblies described above). Thus, wear and damage problems from such forces continue to exist. In addition, unwanted frictional noises have not been satisfactorily eliminated or reduced.

[0005] Further, there exists a need for an improved clip assembly which satisfactorily allows for and addresses a range of panel movements and which raises up and supports the panels at their undersides sufficient to allow the panels to avoid rubbing contact with the substrate, on which the panel clips are mounted. No existing clip assembly addresses the need for an assembly that includes these features and that allows for and addresses various ranges of movement experienced by panels and that also eliminates or reduces corresponding frictional noises and wear.

SUMMARY OF THE INVENTION

[0006] It is therefore an object of the present invention to address the above shortcomings of the prior art. In particular, it is an object of the present invention to allow movement of the panels. It is a further object of the present invention to allow for panel movements in the planes of the panels that are both longitudinal and transverse to the seam formed by adjoining panels and typically arising from thermal expansion or contraction of the panels. It is also an object of the present invention to

reduce wear and noise resulting from frictional movement of roof panels against a substrate or clip assembly.

[0007] In one aspect of the present invention, the clip assembly secures standing seam skylight or roofing panels to a substrate and allows for longitudinal movement by the panels, while eliminating or reducing frictional noises and wear. The clip assembly may also be used with wall panel systems.

[0008] In another aspect of the present invention, a clip assembly for use with a panel system is provided. The clip assembly includes a first clip member having an upright member and an upper flange member and a lower flange member extending therefrom. The assembly further includes a second clip member having an upright member and an upper flange member and a lower flange member extending therefrom. The lower flange member of the second clip member extends in a substantially same direction as the lower flange member of the first clip member. A gap is formed between the upright member of the first clip member and the upright member of the second clip member and the first clip member and the second clip member constrain adjoining panels of the panel system against forces.

[0009] In yet another aspect of the present invention, a slideable clip assembly for use with a panel system includes a first and second clip member, each having an upright member having a first and a second end. An upper flange member extends from the upper end and a lower flange member extends from the lower end of each clip member. A base member is also provided which has a means for communicating with at least the lower flange member of the second clip member such that the first clip member and the second clip member slide between a first position and a second position while the base member remains stationary.

BRIEF DESCIRPTION OF THE DRAWINGS

[0010] The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

[0011] FIG. 1 is an isometric view of a preferred embodiment of the clip assembly of the present invention;

[0012] FIG. 2 is a sectional view of the clip assembly of the present invention used with a standing seam roof or skylight assembly;

[0013] FIG. 3 is an isometric view of another alternative embodiment of the clip assembly of FIG. 2;

[0014] FIG. 4 is a sectional view of the clip assembly of FIG. 3 adapted for use with a standing seam roof or skylight assembly;

[0015] FIG. 5 is an exploded view of another embodiment of the clip assembly;

[0016] FIG. 6 is a sectional view of the clip assembly of FIG. 5 adapted for use with a standing seam roof or skylight assembly;

[0017] FIG. 7 is a sectional view of yet another embodiment of a clip assembly embodying the invention shown adapted for use in a standing seam roof or skylight assembly;

[0018] FIG. 8 is an exploded view of another alternative embodiment of the clip assembly of the present invention;

[0019] FIG. 9 is a sectional view of the clip assembly of FIG. 8 adapted for use with a standing seam roof or skylight assembly;

[0020] FIG. 10 is an exploded view of another embodiment of the clip assembly;

[0021] FIG. 11 is a sectional view of another embodiment of the clip assembly of FIG. 10 adapted for use with a standing seam roof or skylight assembly;

[0022] FIG. 12 is a sectional view of the clip assembly, showing the extent of possible travel; and

[0023] FIG. 13 is a sectional view of the clip assembly in a neutral position.

DETAILED DESCRIPTIONS OF PREFERRED EMBODIMENTS OF THE INVENTION

[0024] FIG. 1 in an isometric view of a preferred embodiment of the clip assembly of the present invention. In this embodiment, the clip assembly is generally designated by reference numeral 140. The clip assembly 140 includes a first clip member 142 and a second clip member 144. The first clip member is substantially a "C" shaped clip member having an upright body portion 142a and respective upper and lower extending horizontal flanges 142b and 142c. The lower horizontal flange

142c includes openings or holes 146 designed to accommodate a fastening member. The second clip member 144 is substantially an "S" shaped clip member having an upright body portion 144a and upper and lower extending horizontal flanges 144b and 144c, where the upper and lower extending horizontal flanges 144b and 144c extend in opposite directions. The lower horizontal extending flange 144c further includes holes 146 corresponding to and aligned with the holes 146 of the horizontal extending flange 142c.

[0025] In the assembled configuration of FIG. 2, the first and second clip members 142 and 144 are mated together. In this configuration, the upper horizontal flange 142b and 144b extend in opposing directions. Additionally, the lower horizontal flange 144c extends in a same direction and is positioned beneath the lower horizontal flange 142c. In this manner, the holes 146 of each clip member 142 and 144 are aligned, thus allowing a fastening member to pass therethrough. A gap 130 is provided between the first and second clip member 142 and 144 and is best observed in FIG. 1 between the respective upright body portions 142a and 144a. Gaps 145 and 145a, typically 1/16" to 3/8" occur between flanges 142b and 144b and the tops of the upright legs of the panels. In this embodiment, the clip assembly 140 is made of 20 gauge carbon or stainless steel, where each upright body portion is two inches or more in length. The gap 130 is approximately 1/16 to 3/8 inch. It should be recognized by those of ordinary skill in the art, however, that the sizes and dimensions discussed herein are only indicative of one embodiment of the present invention and that other sizes and dimensions may equally be used with the present invention.

[0026] FIG. 2 is a sectional view of the clip assembly 140 of the present invention, here shown used with a typical standing seam roof or skylight assembly. In this assembly, it is seen that the clip assembly 140 is designed to constrain standing seam panels 170 and 180 in conjunction with snap-on joining batten 190 against upward or (limited) sideways movement, but not against movement longitudinal with the panels. In this embodiment the batten 190 is provided with a fin 192 positioned as shown in a gap 130 between upright body portions 142a, 144a, (see FIG. 1) of clip assembly 140. The clip assembly 140 is secured to a substrate 200 via fasteners 210 that pass through the holes 146 in the lower horizontal flanges 142c and 144c. As demonstrated in FIG. 2, the gap 130 provides a guide for fin 192 of the batten 190. In

this manner, the fin 192 can pass between the upper horizontal flanges 142b and 144b. If gap 130 is sufficiently wide and/or if the optional fin is not present, the gap 130 allows for slight side-to-side movement of upright body portions 142a and 144a when subjected to transverse forces. This movement allows the clip assemblies to accommodate slight transverse panel movement. It is to be understood battens without fins may also be used effectively in the practice of the instant invention.

[0027] FIG. 3 is an isometric view of another embodiment of the clip assembly and should be studied with the sectional view of FIG. 4. In the clip assembly of FIG. 3, the lower horizontal flange 142c includes a shoulder or shelf 142d, which is formed by a stepped portion. The shelf 142d may be formed by extending and bending the horizontal flange 142c of FIG. 1 and bending a portion of the lower horizontal flange 142c, as shown in FIG. 3 to form the shelf 142d. In this embodiment, a base member 148 is also provided with a stepped portion 148a. In this configuration, the base member 148 extends beneath the lower horizontal flanges 142c and 144c, with the stepped portion 148a extending in a same direction as the upper horizontal flange 144b. The base member 148 also includes holes 146 aligning with the holes of the lower horizontal flanges 142c and 144c. The stepped portion 148a of the base member 148 is substantially the same height as the stepped portion 142d of the first clip member 142.

[0028] FIG. 4 shows a sectional view of the clip assembly of FIG. 3 used with a standing seam roof or skylight assembly. In the assembled configuration, the stepped portions 148a and 142d provide a resting place for the panels 170 and 180 to prevent the panels from rubbing on the heads of fasteners during longitudinal thermal expansion of the panels and to raise and support panels 170 and 180 at least ¼ inch above the substrate 200, thus eliminating contact between the panels and the substrate.

[0029] FIGS. 5 and 6 should be studied together. FIG. 6 is a sectional view of another embodiment of the clip assembly of the present invention and FIG. 5 is an exploded view of the clip assembly of FIG. 6. In this embodiment, as best seen in FIG. 5, the clip member 144 includes a "punched" out portion 144d that acts as a shelf. The shelf 144d includes a vertical leg 144f. The horizontal surface 144d is substantially of the same height as the stepped portion 142d of the clip member 142. In use, the panels 170 or 180, as shown in FIG. 6 will rest on the horizontal surface

144d and the vertical leg 144f$_{will}$ rest on the substrate 200. It should be understood that the clip assemblies of Figs. 2-6 are fixed relative to the substrate and cause the roof/skylight panels to slide on the clip assemblies during thermal expansion or contraction.

[0030] FIG. 7 is a sectional view of another embodiment of the clip assembly of the present invention, shown adapted for use in a standing roof assembly. In this embodiment, each clip member 142 and 144 includes a bottom curved or substantially "U" shaped member 142e and 144e, respectively, to form upward facing hooks. The hook 144e is nested within the hook 142e, and each hook 142e and 144e is engaged by base member clamp 150. More particularly, the hooks 142e and 144e are engaged by a downward extending hook 150a of the base member clamp 150. The base member clamp 150 further includes a hole(s) or opening(s) 146. Also provided is an additional base member 152 having stepped portions 152a, 152b extending upward and horizontally. In the assembled configuration, the base member clamp 150 rests on the base member 152 such that the hole(s) of both base member clamps 150 and 152 are aligned, allowing a fastening member 210 to pass therethrough and be secured in substrate 200. The stepped portions 152a, 152b are substantially equivalent in function to the stepped portions 148a and 142d of FIG. 4 and the stepped portions 144d, 142d of FIG. 6. The engagement of the hooked portions 142e, 144e allows sliding movement between the clip members and the base clamp member 150 secured to the base member 152, where the fastener 210 is in place.

[0031] FIGS. 8 and 9 should be studied together in conjunction with the description that follows. FIG. 8 is an exploded view of another embodiment of the clip assembly of the present invention. The clip assembly will be referred to as the upper clip assembly in the description that follows. The upper portion of the exploded view includes the features of the embodiment of FIG. 2, except that the lower horizontal flanges 142c, 144c do not include holes. However, holes 147 are provided on each of the upper horizontal flanges 142b and 144b. The holes 147 are designed to accommodate pins generally designated as "P". The embodiment of FIG. 8 further includes a base member 148. The base member 148 includes a stepped portion 148a, in addition to a vertical leg portion 148b on an opposing end of the base member 148. A second base unit 154 is provided which has an upward extending, curved, shelf

portion 156 that forms a nearly closed channel 158. The shelf portion 156 is substantially the same height as the stepped portion 148a. The second base unit 154 also includes holes 146 that are aligned with the holes 146 of the base member 148.

[0032] In an assembled configuration, as shown in FIG. 9, the pins "P" extend through the holes 147 of the upper horizontal flanges 142b and 144b respectively, and are inserted through upright portions 170a, 180a of the panels 170 and 180. This allows the upper clip assembly, as noted above, to be securely fastened to the panels, thus allowing the upper clip assembly to move in unison with the panels 170, 180 during expansion or contraction or other longitudinal movement of the panels. The fastening device 210 extends through the holes 146 of the base member 148 and the second base unit 154. This secures the base units 148, 154 to a substrate not shown. The vertical leg 148b rests approximate to the upright body portion 142a, while the lower horizontal flanges 142c and 144c are slideably mated within the channel 158, as shown in FIG. 9. This latter feature allows the entire panel assembly and upper clip assembly to slide in a longitudinal direction. The panels 170 and 180 rest on the shelf portions 156 and 148a, respectively.

[0033] FIGS. 10 and 11 represent a further embodiment of the clip assembly based on the embodiment of the clip assembly of FIG. 8. In this embodiment, the base member 148 includes a tabbed portion 162 extending from the vertical leg 148b. The tabbed portion 162 communicates with a slot 160 positioned within the upright body portion 144a. The tabbed portion 162 is centered with respect to both the upright portion 148b and the slot 160. The tabbed portion 162 is designed to slide freely within the slot 162 between either end of the slot. For example, as clip members 142, 144 slide in each longitudinal direction, clip member 144 is constrained from further movement whenever one end of the tabbed portion 162 makes contact with an adjoining end of the slot 160. At maximum extension, the end of the slot reaches the tab, thus limiting the extent to which the clip member 144 can slide in either longitudinal direction. This latter feature is illustrated in FIG. 12, whereas FIG. 13 shows the clip assembly in the neutral position. In this embodiment, the base member 148 is approximately 3 inches long, although it is contemplated that the base member can be any length, such as 1½ inch, 6 inches, etc.

[0034] Referring to FIG. 13 when installing the slideable clip assembly into a standing seam panel, it is desirable to know that the sliding portion is initially fixed in the center of its range of movement. If so configured, the sliding clip assembly can move in one direction as the panels become colder and in the other direction as the panels become warmer. In order to hold the clip assembly in the central (neutral) position temporarily (until the clip installation is complete), a small dab of sealant 171 may be applied at both ends of base member 148. The sealant will prevent sliding during the assembly process, but will break away and/or disintegrate the first time the clip assembly is caused to move due to thermal expansion of the roof/skylight sheets. By that time, the clip assembly will have been properly located within the roof/skylight panel assembly. The sealant may be a semi-strong material such as plaster, for example.

[0035] While the invention has been described in terms of preferred embodiments, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the appended claims.

It is claimed:

1. A clip assembly for use with a panel system, comprising: